CLAIMS

1. Illumination system for a microlithographic projection exposure apparatus comprising:

a) a light source (12) for generating a projection light beam,

b) a first objective (20) and

c) a masking system (38, 52) for masking a reticle (30), said masking system including

i) adjustable first blades (40) for masking in a first spatial direction (X), wherein the first blades are arranged in or in close proximity to a first field plane (36), and

ii) adjustable second blades (54, 56) for masking in a second spatial direction (Y), wherein the second blades are arranged in or in close proximity of a second field plane (44) which is different from the first field plane (36).

2. Illumination system as claimed in claim 1, wherein the first objective (20) images a first optical raster element (16) arranged before the first objective (20) in the beam propagation direction on the first field

plane (36), and wherein the illumination system (10) further includes a second objective (42) arranged behind the first objective (20) in the beam propagation direction, which second objective (42) images the first field plane (36) on the second field plane (44).

3. Illumination system as claimed in claim 2, wherein a second optical raster element (28) which expands a transiting light beam exclusively in the first spatial direction (X) is arranged in the first objective (20), and wherein a third optical raster element (48) which expands a transiting light beam exclusively in the second spatial direction (Y) is arranged in the second objective (42).

4. Illumination system as claimed in claim 3, wherein the second optical raster element (28) is arranged close to the pupil within the first objective (20) and the third optical raster element (48) is arranged close to the pupil within the second objective (42).

5. Illumination system as claimed in any one of the preceding claims, wherein, by means of the first blades (40) and the second blades (54, 56), a substantially strip-shaped light field (32), the extension of which is shorter in the first spatial direction (X) than in the second spatial direction (Y), is definable on the reticle (30).

6. Illumination system as claimed in any one of the preceding claims, wherein an attenuation system (60) for locally variable attenuation of the light intensity is arranged in the second field plane (44).

7. Illumination system as claimed in any one of the preceding claims, wherein the first objective (20) and the second objective (42) are so designed that the light field in the first field plane (36) is smaller than the light field in the second field plane (44).

8. Illumination system as claimed in any one of the preceding claims, wherein a manipulator (50) for manipulating the pupil is arranged in the second objective (42).

9. Illumination system as claimed in any one of the preceding claims, wherein the first objective is a zoom-axicon objective (20) having two axicon lenses (22, 24) which are adjustable relative to one another.

10. Illumination system as claimed in any one of the preceding claims, wherein the illumination system (10) includes a third objective (58) which images the second field plane (44) on a third field plane in which the reticle (30) is arranged.

11. Microlithographic projection exposure apparatus for imaging structures contained in a movably arranged

reticle (30) on a light-sensitive layer (124), comprising a transmission filter (162) having a locally varying transmissivity and being movable synchronously with movements of the reticle (30).

12. Projection exposure apparatus as claimed in claim 11, wherein the projection exposure apparatus (100) further comprises:

a) an illumination system (110) for generating a projection light beam, which illumination system (110) contains a light source (12) and an imaging optical system (58),

b) a first traversing system (118) for moving the reticle (30) in an image plane (116) of the optical system (58),

c) a projection lens (112) for imaging the structures contained in the reticle (30) on the light-sensitive layer (124),

d) a second traversing system (128) for moving a carrier (126) of the light-sensitive layer (124),

e) a third traversing system (164) for moving the transmission filter (162) into or close to a field plane (44) of the optical system (58) conjugate to the image plane (116),

f) a control system (130) for the traversing systems (118, 128, 164) for controlling the traversing systems (118, 128, 164) in such a way that the reticle (30), the support (126) and the transmission filter (162) move synchronously.

13. Projection exposure apparatus as claimed in claim 11 or 12, wherein to each point on the transmission filter (162) precisely one point on the reticle (30) is coordinated, and wherein, conversely, to each point on the reticle (30) precisely one point on the transmission filter (162) is coordinated.

14. Projection exposure apparatus as claimed in any one of claims 11 to 13, wherein the distribution of the transmissivity over a surface of the transmission filter (162) exposed to projection light is so defined that at least approximately the same light energy per unit area impinges on each point on the light-sensitive layer (124) which is subjected to projection light as a result of the projection of the reticle (30).

15. Method for homogenising the light energy which impinges per unit area on a light-sensitive surface (124) in a microlithographic projection exposure apparatus (100), which light-sensitive surface (124) can be arranged in an image plane (122) of a projection lens (112) of the projection exposure apparatus (100), said method comprising the following steps:

a) arrangement of a light-sensitive element (124) in the image plane (122);

b) projection of a reticle (30) on the light-sensitive element (124) under the conditions under which microstructured components are to be manufactured using the reticle (30), in a scanning process in which the light-sensitive element (124) is moved synchronously with the reticle (30);

c) locally-resolved determination of the light energy impinging on the light-sensitive element (124) per unit area;

d) determination of the smallest value of light energy which has been detected in step b) for a point to be exposed on the light-sensitive element (124);

e) provision of a traversing system (164) for a transmission filter (162) with locally varying transmissivity, with which traversing system (164) the transmission filter (162) can be moved synchronously with traversing movements of the reticle (30);

f) determination of the local distribution of the transmissivity of the transmission filter (162) in such a way that, during a further projection in which the transmission filter (162) is moved synchronously with the reticle (30), the smallest value

for the light energy impinging per unit area determined in step c) is at least approximately achieved at all points to be exposed on a light-sensitive layer (124) arranged in the image plane (122).

16. Method as claimed in claim 15, wherein the light--sensitive element is a measuring sensor.

17. Method as claimed in claim 15, wherein the light--sensitive element is a light-sensitive photoresist.

18. Illumination system for a microlithographic projection exposure apparatus comprising:

a) a light source (12),

b) a first objective (20) that has a first pupil plane (26) and includes two axicon lenses (22, 24) which can be displaced relative to each other,

c) a first optical raster element (16) which is arranged in an object plane (18) of the first objective (20),

d) a second objective (28) arranged in the optical path behind first objective (20) and imaging the first pupil plane (26) onto a second pupil plane (30),

e) a second optical raster element (32) arranged in the second pupil plane (30).

19. Illumination system as claimed in claim 18, wherein the second objective (28) has a magnification between about 0.5 and 2.